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Solvability of geometrically nonlinear boundary-value problems for shallow shells of Timoshenko type with pivotally supported edges

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Abstract

© 2015, Allerton Press, Inc. We study solvability of a geometrically nonlinear, physically linear boundary-value problems for elastic shallow homogeneous isotropic shells with pivotally supported edges in the framework of S. P. Timoshenko's shear model. The purpose of work is the proof of the theorem on existence of solutions. Research method consists in reducing the original system of equilibrium equations to one nonlinear differential equation for the deflection. The method is based on integral representations for displacements, which are built with the help of the general solutions of the nonhomogeneous Cauchy-Riemann equation. The solvability of equation relative to deflection is established with the use of principle of contraction mappings.

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Keywords

boundary-value problem, equilibrium equations system, generalized problem solution, generalized shifts, holomorphic functions existence theorem, integral equations, integral images, operator, Sobolev spaces, Timoshenko type shell